Lesson 10.1.1

10-7. **a:** \$165 **b:** $t(n) = 50 + 5(n-1)$ **c:** \$930

10-8. **a:** 4050 **b:** 300 + 550 + 800 + … + 4050; $t(n) = 300 + 250(n-1)$

10-9. **a:** $t(n) = 3 + 7(n-1)$ **b:** $t(n) = 20 - 9(n-1)$

10-10. –2

10-11. **a:** x-intercepts (2.71, 0) and (5.29, 0), y-intercept (0, 43)

b: x-intercepts (–1, 0) and (2.5, 0), y-intercept (0, –5)

10-12. **a:** normcdf(70, 79, 74, 5) = 0.629, About 63% would be considered average.

b: normcdf(–10^99, 66, 74, 5) = 0.055, Between 5 and 6% of would be in excellent shape.

c: normcdf(–10^99, 66, 70, 5) – 0.0548 from part (b) = 0.157; There would be a nearly 16% increase in young women classified as being in excellent shape.

10-13. **a:** $\sqrt{233}$ units **b:** $\sqrt{(x-5)^2 + (y-2)^2}$ units

10-14. \$20.14

10-15. 34,800 people

10-16. Yes, because the sum of the diameters is 830 mm.

10-17. 235

10-18. $(-6) + (-3) + 0 + 3 + 6 + 9 + 12 + 15 + 18$

10-19. It is the 55^{th} term.

10-20. 220

10-21. **a:** ${}_{10}P_5 = 30,240$ **b:** $10 \cdot 9^4 = 65,610$

10-22. $n = \pm 6\sqrt{2}$

10-23. **a:** 2 **b:** $\frac{3}{4}$

10-24. **a:** It looks like an endless wave repeating the original cycle over and over again.

b: A polynomial of degree n has at most n roots, but $f(x) = \sin(x)$ has infinitely many roots. Also, every polynomial eventually heads away from the x-axis.

Lesson 10.1.2

10-34. **a:** odds: $t(n)=1+2(n-1)$, evens: $t(n)=2+2(n-1)$

b: odds: 5625, evens: 5700

10-35. **a:** $t(n)=21-4(n-1)$

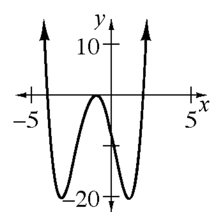
b: 31; You can solve the equation $25-4n=-99$.

c: –1209

10-36. 15

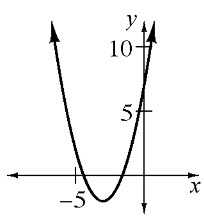
10-37. $_6P_4 = 360$

10-38. Degree 4; Graph shown at right.

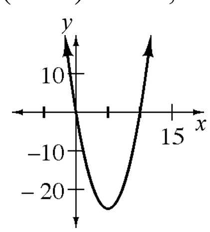


10-39. $f(x)=\frac{1}{4}(x-3)(x-2)(x+1)$

10-40. **a:** $f(x)=(x+3)^2-2$, vertex (–3, –2)



b: $f(x)=(x-5)^2-25$, vertex (5, –25)



10-41. For David: normcdf(122, 10^99,149,13.6) = 0.976
For Regina: normcdf(130, 10^99,145,8.2) = 0.966
For now David is relatively faster.

10-42. **a:** $\frac{\pi}{4}$ **b:** $\frac{5\pi}{12}$ **c:** $-\frac{\pi}{12}$ **d:** $\frac{5\pi}{2}$

Lesson 10.1.3

10-49. **a:** 16,200 **b:** 16,040 **c:** 564

10-50. $11+22+33+...+99=495$

10-51. **a:** Sample response: The terms decrease by two, then add seven, then decrease by two, and then add seven continually.

b: It is not arithmetic because the difference from one term to the next is not constant.

c: Find the sum of each "unzipped" series and then add these sums together. The sum is 32,240.

10-52. **a:** ${}_{12}C_{10}=66$ **b:** ${}_{9}C_{7}=36$

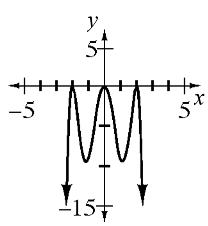
10-53. Some may substitute for x, others may set x equal to $3+i\sqrt{2}$ and work back to the equation, others may write the two factors and multiply to get the original equation, and others may solve by completing the square.

10-54. The graphs of $y=2^x$ and $y=5-x$ intersect at only one point.

10-55. $h=\$2.50$, $m=\$1.75$

10-56. **a:** 17 **b:** 5

10-57.



Lesson 10.1.4

10-62. **a:** $\sum_{k=1}^{11}(60-13k)=-198$ **b:** $\sum_{k=1}^{n}(3+7(k-1))=\frac{n(3+7(n-1))}{2}$

10-63. 495,550

10-64. It works for the integers from 1 through 39.

10-65. **a:** $7\cdot 3^n$ **b:** $10(0.6)^{n-1}$

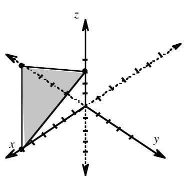
10-66. $9!=362,880$

10-67. **a:** normalcdf(–10^99, 59, 63.8, 2.7) = 0.0377; 3.77%

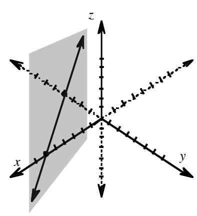
b: (0.0377)(324)(half girls) = 6 girls

c: normalcdf(72,10^99, 63.8, 2.7) = 0.00119. (0.00119)(324)(half) = 0.19 girls. We would not expect to see any girls over 6ft tall.

10-68. **a:**



b:



10-69. $\cos(\frac{2\pi}{3})=-\frac{1}{2}$, $\cos(\frac{4\pi}{3})=-\frac{1}{2}$, $\cos(\frac{5\pi}{3})=\frac{1}{2}$

Lesson 10.2.1 (Day 1)

10-87. a: $3+30+300+3{,}000+30{,}000+300{,}000=333{,}333$

b: Write the series $3+30+...+300{,}000=S(6)$ twice. Multiply one of them by 10. Subtract $10S(6)-S(6)=2{,}999{,}997=9S(6)$. Divide by 9 to get 333,333.

c: $\sum_{i=1}^{n} 3\cdot 10^{i-1}=\frac{3\cdot 10^{n}-3}{9}$

10-88. a: A sequence would represent the list of the class sizes of the graduating classes as the number of years since the school opened increased. The corresponding series would represent the growing number of alumni.

b: $t(10)=150$; total = 960

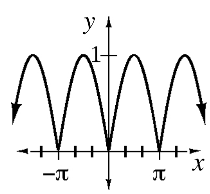
c: $n(36+6n)=36n+6n^2$

10-89. a: 15 **b:** –615

10-90. 210, arithmetic

10-91. a: ${}_{23}P_3=10{,}626$ **b:** ${}_{23}C_3=1771$ **c:** $1\cdot 22\cdot 22=484$ **d:** $4\cdot 22\cdot 22=1848$

10-92. See graph at right.

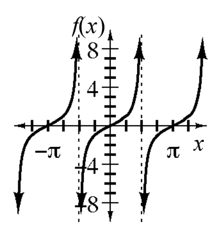


10-93. a: $\frac{x-2}{x+2}$

b: $\frac{x-3}{2x+1}$

c: Use the Distributive Property to factor and the multiplicative property of 1 to reduce.

10-94. a and b: no amplitude, period = π, LP = (0, 0). See graph at right.



10-95. a: $x=\frac{125}{2}$ **b:** $x=-\frac{4}{5}$

c: $x=0.04$ **d:** $y=\frac{9}{4}$

Lesson 10.2.1 (Day 2)

10-96. Calculate the sums of two geometric series, the first with 25 terms, the second with 15. Retirement at age 55: $1,093,777; at age 65: $1,115,934

10-97. $20,000 at 8% and $30,000 at 6.5%

10-98. **a:** $8! = 40320$ **b:** $1 \cdot 7! = 5040$ **c:** $1 \cdot 7! + 7! \cdot 1 = 10080$

10-99. **a:** $\sqrt{272} = 4\sqrt{17}$ units **b:** $\sqrt{(x+3)^2 + (y+5)^2}$ units

10-100. **a:** $x = \frac{5}{2}$ **b:** $y = 10$ **c:** $x = -3, 2$ **d:** $y = \frac{15}{4}$

10-101. **a:** (2, 8) and (4, 4) **b:** $(3+i, 6-2i)$ and $(3-i, 6+2i)$

c: In system (a), the solutions are the points of intersection. In system (b), the solutions show that they do not intersect.

10-102. $\tan(160°) = -0.3640$, $\tan(200°) = 0.3640$, $\tan(340°) = -0.3640$

10-103. **a:** $x = 4$ **b:** $x = \sqrt{48}$ **c:** $x = 3$ **d:** $x = 6$

10-104. $26 + i$

Lesson 10.2.2

10-117. 500 miles

10-118. **a:** ${}_7C_2 = 21$ **b:** ${}_7C_3 = 35$ **c:** ${}_7C_4 = 35$

d: Choosing three points to form a triangle is the same as choosing four points to *not* be part of the triangle. Those four points form a quadrilateral, ${}_7C_3 = \frac{7!}{4!3!} = \frac{7!}{3!4!} = {}_7C_4$.

10-119. **a:** $10t + u - (10u + t) = 27$ **b:** $x = -13$

10-120. \$1157

10-121. a, d

10-122. **a:** $(x-3)(x^2 - 2x + 5)$ **b:** $3, 1 \pm 2i$

10-123. $\frac{3}{11}$

10-124. $(-1+i, 3), (-1-i, 3)$

10-125. When $|r| \geq 1$, r^n increases in size as n increases, so the expression $1 - r^n$ does not get close to 1, and being able to replace that expression with 1 is a key part of the derivation of the formula.

10-126. $\frac{121}{27}$

10-127. **a:** 45 **b:** 792 **c:** 7

10-128. **a:** $x = -3, 4$ **b:** $x = -1.5, 3$ **c:** $x = \frac{-1 \pm \sqrt{57}}{4}$

d: Never **e:** $x = 0, -2, \frac{4}{3}$ **f:** $x = 0$

10-129. **a:** $-16x^{5/2}y^4z^3$ **b:** $3^{1/2}x^{3/2}y^{8/3}$

10-130. **a:** 0, 5 seconds **b:** $0 \leq t \leq 5$ **c:** 5 seconds **d:** $1 < t < 4$

10-131. Yes; use the Quadratic Formula or direct substitution.

10-132. **a:** $x = -1, 4$ **b:** $x \leq -1$ or $x \geq 4$ **c:** $-1 \leq x \leq 4$

Lesson 10.3.1 (Day 1)

10-145. $x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 35x^3y^4 + 21x^2y^5 + 7xy^6 + y^7$

10-146. $-640w^2z^3$

10-147. 1365

10-148. **a:** 16 **b:** Not possible. $r > 1$, and the terms keep increasing.

10-149. ${}_4C_0 = 1, {}_4C_1 = 4, {}_4C_2 = 6, {}_4C_3 = 4, {}_4C_4 = 1$

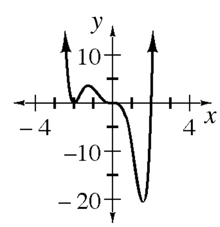
a: The number of possibilities are the elements of the 4th row of the triangle.

b: 1, 6, 15, 20, 15, 6, 1; Use the 6th row of the triangle.

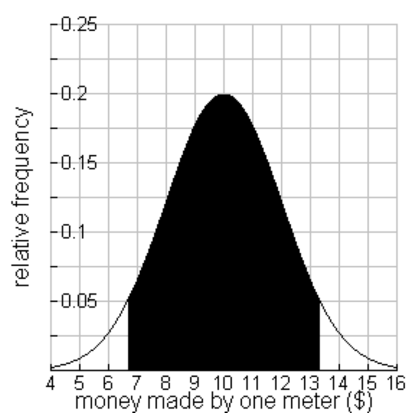
10-150. **a:** ${}_9C_3 = 84$ **b:** ${}_9C_2 = 36$ **c:** ${}_{10}C_3 = {}_9C_3 + {}_9C_2$

d: The tenth row entry of Pascal's Triangle is the sum of the two ninth row entries above it and these numbers correspond to the total number of combinations when one more choice is added.

10-151. See graph at right.



10-152. **a:** See graph below right.
b: Answers will vary. See graph below right.
c: Answers will vary.
normalcdf (6.71, 13.29, 10, 2) = 0.9000



10-153. $(-2, 3, -\frac{1}{2})$

10-154. **a:** $y = x^2 - 4x + 5 = (x-2)^2 + 1$

b: (2, 1)

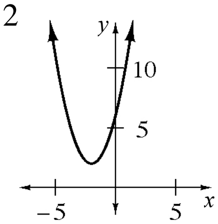
Lesson 10.3.1 (Day 2)

10-155. $42x^3$

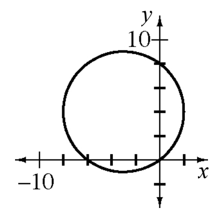
10-156. 728

10-157. $81x^4 + 108x^3 + 54x^2 + 12x + 1$

10-158. **a:** $f(x) = (x+2)^2 + 2$



b: $(x+3)^2 + (y-4)^2 = 25$

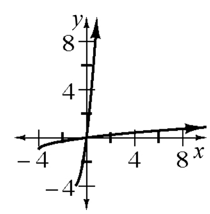


10-159. 32.9 mm

10-160. $y = -2x + 34$

10-161. **a:** See graph at right. **b:** $f^{-1}(x) = [2(x+1)]^2 - 4$

c: $x \geq -1, y \geq -4$ **d:** 5

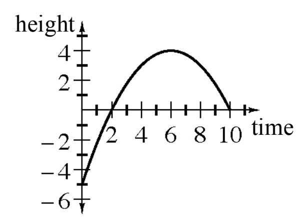


10-162. **a:** $x = 7$ **b:** $x = 1.5$ **c:** $x \approx 1.75$ **d:** $x \approx 1.87$

10-163. **a:** (0, –5), (4, 3), (8, 3) **b:** See graph at right.

c: $y = -\frac{1}{4}x^2 + 3x - 5$ **d:** 10 seconds

e: $0 \leq x \leq 10$ **f:** $0 \leq x < 2$



Lesson 10.3.2

10-169. Robin: \$11,887.58; Tyrell: \$11,815.60, difference: \$71.98

10-170. **a:** \$10,304.56; it rounds off to the same amount.

b: \$10,832,870, 680 and \$10,832,775,720, a difference of \$94,960

c: Maybe billionaires, or other investors of large amounts.

10-171. **a:** $1+\frac{3}{n}+\frac{3}{n^2}+\frac{1}{n^3}$ **b:** $1+\frac{5}{n}+\frac{10}{n^2}+\frac{10}{n^3}+\frac{5}{n^4}+\frac{1}{n^5}$

10-172. **a:** 14.7 lbs./sq. in. **b:** ≈ 12.55 lbs./sq. in. **c:** ≈ 14.83 lbs./sq. in.

10-173. **a:** $2=(1.015)^{4t}$, $2=e^{0.06t}$

b: Quarterly, 11.64 years; Continuously, 11.55 years

c: The difference is about one month, so probably not.

10-174. $(-5,0), (\frac{2}{3},0), (-\frac{1}{4},0)$

10-175. $8x^3-36x^2+54x-27$

10-176. **a:** $\log_2(5x)$ **b:** $\log_2(5x^2)$ **c:** $x = 17$

d: $x=-\frac{9}{20}=-0.45$ **e:** $x = 15$ **f:** $x = 4$

10-177. **a:** $10t + u$

b: $10u + t$

c: $t + u = 11$ and $10t+u-(10u+t)=27$

d: 74 and 47