

Math 1155. Spring 2008.
ANSWER KEYS TO SAMPLE FINALS

Spring 2005.

1c 2a 3b 4d 5c 6d 7b 8a 10d 11b 12b 13a 14d 15b 16b 17b 18a

19.

$$\cos \theta = -\frac{1}{2}, \quad \sin \theta = -\frac{\sqrt{3}}{2}, \quad \csc \theta = -\frac{2}{\sqrt{3}}, \quad \tan \theta = \sqrt{3}, \quad \cot \theta = \frac{1}{\sqrt{3}}.$$

20. (a) Number of positive real zeros: 1. Number of negative real zeros: 3 or 1.

(b) Complex zeros: $-1, 1/3, 2i, -2i$. Factored form:

$$f(x) = (x+1)(3x-1)(x^2+4) = (x+1)(3x-1)(x-2i)(x+2i).$$

22. (b) $\theta = 3\pi/2, 7\pi/6, 11\pi/6$.

22. Four roots: $2(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4})$; $2(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4})$; $2(\cos \frac{5\pi}{4} + i \sin \frac{5\pi}{4})$; $2(\cos \frac{7\pi}{4} + i \sin \frac{7\pi}{4})$.

Fall 2004.

1e 2b 3a 4c 5b 6c 10d 11a 12e 13d 14b 15a 16c 17d

18. (a) Use the intermediate value theorem, for example, $f(-2)f(-1) < 0$. Combine with Descartes' Rule of Signs to show f has exactly 3 real zeros.

(b) (i) odd (ii) 5

(iii) $f(x) = (1/9)x(x-2)^2(x+1)^2$.

19. (a) $-1 < x < 1/2$.

(b) (Use $t = 2^x$.) $x < -1$.

20. (a) $A = 4, B = 2, \omega = \pi/3, \phi = \pi/3$.

(b) $f(x) = 2 \sin(\frac{\pi x}{12} + \frac{\pi}{4}) = 2 \sin(\frac{\pi}{12}(x+3))$.

21. (a) Domain of f is the set of all x such that $x \neq 2, -2$.

Solutions of $f(x) = 0$ are $x = 0, -1$.

Solution set of the inequality $f(x) > 0$ is $(-1, 0) \cup (2, \infty)$.

Solution set of the inequality $f(x) < 0$ is $(-\infty, -2) \cup (-2, -1) \cup (0, 2)$.

(b) No horizontal asymptotes. Vertical asymptotes are: $x = -2$ and $x = 2$. Oblique asymptote: $y = x + 1$.

Spring 2003.

1. (a) Use double angle formula: $\cos(2\theta) = 1 - 2\sin^2 \theta$.

(b) $5/\sqrt{26}$.

2. $T = (\ln 4)/4$.

3. $x^2 + y^2 = 6y$; $x^2 + (y-3)^2 = 9$. Circle centered at $(0, 3)$ with radius 3.

4. $x = 1, -1, -1 + \sqrt{2}, -1 - \sqrt{2}$.

7. $\sqrt{2}(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6})$ and $\sqrt{2}(\cos \frac{7\pi}{6} + i \sin \frac{7\pi}{6})$

9. Angles are $30^\circ, 30^\circ, 120^\circ$ (Use Law of Cosines).

11. $h = c \sin 45^\circ$, where $c = 1000 \sin 30^\circ / \sin 15^\circ$ (Law of Sines).
12. $v_0 = 192$, $d(8) = 768\sqrt{3}$.