11. **B**.

The angle $\frac{2\pi}{3}$ lies between $\frac{\pi}{2}$ and π.
The major angle is therefore $\pi - \frac{2\pi}{3} = \frac{\pi}{3}$.
Now, $\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$.
Since $\frac{2\pi}{3}$ is in quadrant II, $\cos\left(\frac{2\pi}{3}\right) = -\cos\left(\frac{\pi}{3}\right) = -\frac{1}{2}$.

12. **C**.

The range of arctangent is $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$.
Within this range, $\tan(x) = -1$ is satisfied by $x = -\frac{\pi}{4}$.
So $\arctan(-1)$ may be equal to $-\frac{\pi}{4}$.

13. **D**.

$49 + \pi^2$ is not a perfect square, and consequently its square root cannot be simplified.

14. **D**.

In general, $\sqrt[n]{a} = a^{\frac{1}{n}}$.

$$\begin{aligned}\sqrt{(2x^2\sqrt{y})^4} &= \left(\left(2x^2\sqrt{y}\right)^4\right)^{\frac{1}{2}} \\ &= \left(2x^2\sqrt{y}\right)^2 \\ &= 2^2(x^2)^2\sqrt{y}^2 \\ &= 4x^2y.\end{aligned}$$

15. **B**.

Recall $\cos^2(x) + \sin^2(x) = 1$.

$$\begin{aligned}\frac{\cos(x)}{\cos(x)\sin^2(x) + \cos^3(x)} &= \frac{\cos(x)}{\cos(x)[\sin^2(x) + \cos^2(x)]} \\ &= \frac{\cos(x)}{\cos(x)[1]} \\ &= \frac{\cos(x)}{\cos(x)} \\ &= 1.\end{aligned}$$

16. **C**.

$$\begin{aligned} e^{4x-1} &= 1 \\ \ln\left(e^{4x-1}\right) &= \ln(1) \\ (4x-1)\ln(e) &= \ln(1) \\ 4x-1 &= 0 \\ 4x &= 1 \\ x &= \frac{1}{4}. \end{aligned}$$

17. **C**.

$\frac{1}{16} = 2^{-4}$, and thus $\log_2\left(\frac{1}{16}\right) = \log_2\left(2^{-4}\right) = -4$.

18. Recall the equation of a circle with radius r centered at (h, k): $(x-h)^2 + (y-k)^2 = r^2$. So our desired equation is $(x+1)^2 + (y-2)^2 = 3^2$.

19. Given a quadratic equation of the form $y = ax^2 + bx + c$, the x-coordinate of the vertex is given by:
$x = -\frac{b}{2a}$.
Therefore, $x = -\frac{3}{4}$.
We then evaluate $f\left(-\frac{3}{4}\right) = 2(-\frac{3}{4})^2 + 3\left(-\frac{3}{4}\right) - 5 = -\frac{49}{8}$.
So the vertex is located at $\left(-\frac{3}{4}, -\frac{49}{8}\right)$.

20. Since 1 full revolution corresponds to 2π radians, 3 revolutions/minute corresponds to $2\pi * 3 = 6\pi$ radians/minute.
The angular speed, ω, of the object is therefore 6π /min.

Given an angular speed ω, the linear speed, v, of an object traveling in a circle of radius r is given by:
$v = \omega r$.
So $v = (6\pi) * 3 = 18\pi$ ft/min.