1.

$$\int_{-1}^{1} e^{1/x}\,\mathrm{d}x$$

Diverges

2.

$$\int_{0}^{1} 1 + x + x^2\,\mathrm{dx}$$

11/6

3.

$$\int_{-1}^{1} \lfloor x \rfloor \lceil x \rceil$$

0, are these functions well known or nah?

4.

$$\int_{0}^{\pi} \cos(x)\sin(x)$$

0, orthogonal

5.

$$\int_{0}^{1} (2x+1)e^{5x+7}$$

$1/25e^7(-3+13e^5)$

6.

$$\int_{0}^{1} \arctan(x)$$

$\pi/4 - \ln(4)/4$

7.

$$\int_{0}^{1} x\sin^2(x)$$

$\pi^2/4$

8.

$$\int_{0}^{2024} \cos(x)\mathrm{d}\sin(x)$$

2024 $d/dx\sin(x) = \cos x$ hence $d/dx\sin(x)d\sin(x) = 1$

9.

$$\int_{0}^{\infty} \frac{1}{1+e^x}$$

$1 + \ln(2) + \ln(1+e)$

10.
$$\int_0^1 \frac{1}{e^{-x}+e^x}$$
$\pi/4$, multiply numerator and denominator by e^x and substitute $u = e^x$, recognise arctan.

11.
$$\int_0^\pi \max(\cos(x), \sin(x))$$
$1+\sqrt{2}$, note $\cos(x) \geq \sin(x)$ on $[0, \pi/4]$ and $\sin(x) \geq \cos(x)$ on $[\pi/4, \pi]$

12. remember to simplify your answer:
$$\int_0^{2024} x$$
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13.
$$\int_{-1}^1 \tanh^{-1}(x) e^{-\frac{1}{1-x^2}}$$
0

14.
$$\int_{-\pi}^\pi |\sin(x)|$$
4, split up in $[-\pi, 0]$ and $[0, \pi]$

15.
$$\int_0^\infty x^{2024} e^{-x}$$
2024!, can be done by recognising the Γ-function or repeated integration by parts

16.
$$\int_0^{\pi/4} \frac{1}{1-\sin^2(x)}$$
1, recognise the secant squared which integrates to the tangent.

17.
$$\int_{-\pi}^\pi |x + \sin(x)|$$
$4+\pi^2$, split up between $[-\pi, 0]$ and $[0, \pi]$